Math 3298 Exam II, Part II
NAME: **SCORE:**

1. Calculate the double integral $\int\int_D \frac{y}{x^2+y^2} dA$ by converting it to polar coordinates. Here D is the region between circles $x^2+y^2=1$ and $x^2+y^2=4$.

2. Find the surface area of the paraboloid $z = x^2 + y^2$ between $z = 1$ and $z = 4$.

3. Rewrite the integral

$$\int_{-1}^{1}\int_{x^2}^{1}\int_{0}^{1-y} f(x,y,z)dzdydx$$

as an iterated integral in the order $dxdydz$.

4. Calculate the triple integral $\int\int\int_E \frac{1}{x^2+y^2+z^2}dV$ by converting it to spherical coordinates. Here E is the region between sphere $x^2+y^2+z^2=1$ and $x^2+y^2+z^2=4$.

5. Given the following double integrals

$$\int_{1/\sqrt{2}}^{1}\int_{\sqrt{1-x^2}}^{x} xydydx + \int_{1}^{\sqrt{2}}\int_{0}^{x} xydydx + \int_{\sqrt{2}}^{2}\int_{0}^{\sqrt{4-x^2}} xydydx.$$

Sketch all three regions of integration on one XY plane.

6. (BONUS PROBLEM) Use a simple way to calculate it.